Space Science Division




2001 Annual Report

COVER ART: (Artwork: James Schilling)
A collage of images representing the Space Science Division's search for life in, and the understanding of, the universe.

Images:

-Background: Horsehead Nebula (NASA)

Left to right:

-The 30 Doradus Nebula (NASA, Space Telescope Science Institute, La Plata Observatory)
-Artist rendition of human exobiologist and geologist on Mars (NASA / Pat Rawlings)
-Artist conception of Huygens Saturn Probe Titan delivered by Cassini (Craig Attebery, JPL)
-Cyanobacteria (L. Prufert Bebout)

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Space Science Division

2001 Annual Report

National Aeronautics and
Space Administration

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PLANETARY SYSTEMS BRANCH (SST)

EXOBIOLOGY BRANCH (SSX)

Space Science Division (SS) Overview

The Space Science Division at NASA's Ames Research Center conducts research and mission-related activities that are structured around the study of the origins and evolution of stars, planetary systems, and life, and that address some of the most fundamental questions pursued by science, questions that examine the origin of life and our place in the universe, and questions that lie at the heart of the emerging discipline of Astrobiology.

Ames is recognized as a world leader in Astrobiology, defined as the study of life in the universe and the chemical and physical forces and adaptations that influence life's origin, evolution, and destiny. In pursuing this primary Center mission in Astrobiology, scientists in the Space Science Division perform pioneering basic research and technology development to advance fundamental knowledge about the origin, evolution, and distribution of life within the context of cosmic processes. To accomplish this objective the Division has assembled a multidisciplinary team of scientists including astronomers, astrophysicists, chemists, microbiologists, physicists, and planetary scientists. This objective also requires access to the space environment, since many of the critical data needed to elucidate the evolutionary steps outlined above are only available in space in star-forming regions, in the interstellar medium, and in and around planetary environments.

Major elements of the Space Science Division's program include the study of the interstellar gas and dust that form the raw material for stars, planets, and life; the processes of star and planet formation; the evolution of planets and their atmospheres; the origin of life and its early evolution on the Earth; the search for past or present life throughout the solar system with emphasis on Mars; and advanced technologies for robotic and human exploration of space.

Space Science Division personnel participate in a variety of major NASA space missions. Division scientists are / were Investigators, Team Members, or Interdisciplinary Scientists on Pioneer, Voyager, Viking, Galileo, the Kuiper Airborne Observatory, Mars Pathfinder, the Infrared Space Observatory, the Cassini mission to Saturn, Stardust, Mars Global Surveyor, and Kepler. Division scientists are also involved in the development of experiments for International Space Station, the Stratospheric Observatory for Infrared Astronomy (SOFIA), Astrobiology Explorer, several Mars Scout missions, the Space Infrared Telescope Facility (SIRTF), and Next Generation Space Telescope (NGST).

The programs in the Space Science Division are international in scope, ranging from active participation in international scientific meetings and societies, to collaborative ground-based research projects, to scientific investigations on international flight missions and projects.

Extensive ties are maintained with the academic community through collaborative research programs and development of science curricula materials, and additionally, students at all levels represent a significant component of the Division's on-site research work force.

The Space Science Division represents a unique resource for NASA's Astrobiology thrust and for the Agency's current and future manned and unmanned missions. The total science and mission capability of the Space Science Division described here is unmatched by any other NASA Center or national laboratory.

The Division is organizationally divided into four Branches named according to the focus areas of the research conducted by the scientists in those Branches: Astrophysics, Astrobiology Technology, Exobiology, and Planetary Systems (see Figure 1).

In 2001, the Division employed approximately 75 civil service personnel, about 45 of whom are Ph.D. scientists. This core permanent staff is augmented with approximately 125 non-civil servant scientists and technical support personnel who are resident in Division facilities through mechanisms such as grants, cooperative agreements, support contracts, fellowships, visiting scientist positions, and student internships.

It is common for visiting scientists to spend their summer research or sabbatical time in the Division's laboratories and facilities. Extensive ties are maintained with the academic community through collaborative research programs and also through the development of science curricula materials. The Space Science Division is dedicated to fostering greater interest in careers in the sciences and provides unique opportunities for training the next generation of scientists. Students at all levels – high school, undergraduate, graduate, and post-doctoral – represent a significant component of the Division's on-site research work force. In 2001, approximately 20 National Research Council Postdoctoral Fellows and 10 undergraduate students were resident in the Division. Division personnel also mentored students in the Astrobiology Academy, a competitive program for college undergraduates to participate in hands-on research projects here at Ames Research Center.

In the following section of the Annual Report, the research programs of each Branch are summarized. Within each area, several examples of 2001 research topics have been selected (from a total of approximately 130 tasks) for more detailed description. Following that section is a list of publications authored by Division personnel with 2001 publication dates. Finally, if a particular project is of interest, the organization chart on page 8 and the personnel roster that begins on page 79 are reasonably current and may be used to contact individual scientists. ❑

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http://www-space.arc.nasa.gov
October 2002

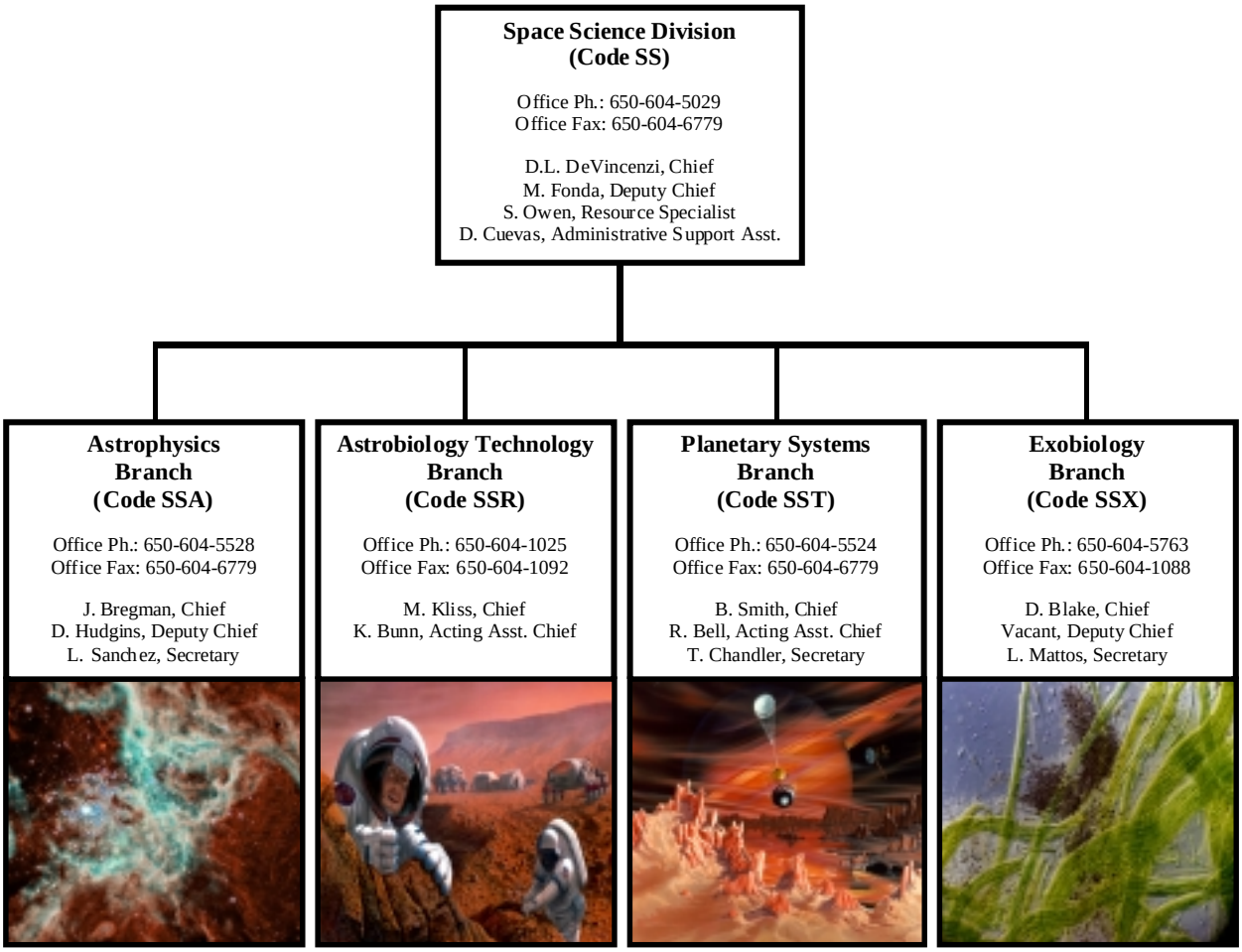

Figure 1: Space Science Division Organization Chart